Project Title: Yates Waste rock Pile Reclamation and Whitewood Creek Channel Restoration

Location: Leed, South Dakota

Client: Homestake Mining Company

Role and Responsibility of Key Member: Professional Engineer in Responsible Charge/Engineer of Record

Project Description:

After 125 years of mining in the Black Hills of South Dakota, the Homestake Mining Company (Homestake) began a process of closure and reclamation. One component of the reclamation effort would involve the regrading and covering of the Yates waste rock pile and the relocation and restoration of a more than 4,000 foot long reach of Whitewood Creek. Over 1,800 foot of the reach was actually flowing in a concrete box culvert and buried under mine waste. There was very little room to work within the valley floor which contained not just the creek channel, but a county road, the waste rock pile, and an old railroad grade now serving as a public trail corridor that was **not to be disturbed!** The project would involve moving the stream channel against the far side of the valley away from the waste rock pile. The relocation would involve a modest rock cut to accommodate the alignment. The clean, non-acid generating rock from that excavation would then be placed on the opposite side of the valley to support the county road and provide a buffer between the relocated stream channel and the waste rock. A geosynthetic liner was placed against the stream and facilitate the collection of seepage from the waste rock for treatment. The waste rock was regraded to a stable slope configuration, and the Mickelson Trail was not disturbed.

Data was collected from relatively undisturbed reaches both upstream and downstream of the restoration reach using the Rosgen classification system. Design cross section dimensions and bed material gradations were specified to match bed materials observed in the natural channels. Rock vortex weirs and J hooks were used at both the upstream and downstream ends of the reach to isolate the restoration reach and prevent any future channel adjustments from migrating either upstream or down. The center of the reach was left to establish its own step-pool profile over time. A linear peak stone toe revetment was used along the waste rock side of the channel to prevent any lateral migration into the toe of the regraded slope. Several fish habitat features were incorporated into the channel design including a centrally located riffle section for benthic invertebrates (trout food). Random boulder placements were incorporated in the channel bed, most below the normal flow depth (for the fish to hide behind) and a few above the normal flow depth (for the birds to perch on and catch fish).



Yates Waste Rock Pile Pre-reclamation (Left) and Post-reclamation (Right)



The Restored Whitewood Creek Reach Looking Down Stream

The cost of the stream restoration portion of this project (i.e., excluding the road and bridge construction, the waste rock regrading, and the cover soil placement) was approximately \$250 per lineal foot (in 2004 dollars). This is well below the cost of constructing a riprap lined trapezoidal channel for the same reach.

Five years after completion of construction we were able to return to this site with a fly rod and catch eight trout from a stream that did not even exist five years earlier.